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Mr. A. Richard Metzger, Jr.
Acting Chief, Common Carrier Bureau
Federal Communications Commission
1919 M Street, N.W., Room 500
Washington, D.C. 20554

CC DKt 95-116

Dear Mr Metzger:

The Illinois FCC LNP Field Test came to a successful conclusion on September 26, 1997. The five participating service providers, Ameritech, AT&T, MCI, Sprint, and TCG have proven that not only does LRN LNP work, but that disparate members of industry, competitors, can work together to accomplish the public good. This is a huge step in what has proven an arduous journey.

Attached is the Illinois FCC LNP Field Test Final Report. It provides a guide to the results of the Field Test as well as comments by each of the five providers, and a matrix of the tests completed. I hope that you find it fully informative. However, should you have any questions or require more information please call me at 312-814-6025.

Sincerely,

Brent A. Struthers

cc.   Carol E. Mattey
       Steven Teplitz

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Illinois FCC LNP Field Test

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

FINAL REPORT

Compiled under the supervision of

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FCC Field Test
Executive Summary

The Illinois FCC Local Number Portability (LNP) Field Test has been conducted by the Service Providers (Ameritech, AT&T, MCI, Sprint, and TCG) in Chicago as directed by the FCC. This test verified the viability of the Location Routing Number (LRN) method and ensured that the technology intended for long-term service provider number portability was consistent with the performance criteria established by the FCC.

The objective of the Illinois FCC LNP Field Test was to demonstrate the feasibility of a long term database Local Number Portability solution (LRN) in a functional network situation using participant equipment and personnel to determine network and operational impacts. The Field Test successfully demonstrated that LNP could be achieved via the LRN database industry chosen solution.

The FCC Field Test provided an opportunity for all participants to implement and test the technical and operational requirements in connection with an LNP database solution. The FCC Field Test was conducted using the LRN local number portability routing scheme.

Using a committee developed test plan which guided participants through the execution of intra-network and inter-network testing of the LRN database LNP solution. The tests were conducted by the participants and their vendors utilizing test telephone numbers that reside within live NPA-NXXs to emulate the moving of live customers. Actual customers and their working dialed numbers (DNs) were not involved.

Testing involved the establishment of portable NPA-NXXs, making translation updates to the participant's switch and SS7 network for routing of ported calls between participants' switches. Additionally, the operational processes were performed in order to emulate the moving a customer from one Local Service Provider (LSP) to another LSP, and ensuring that the phone service was functioning properly without loss of functionality.

Lessons Learned

- Careful coordination and sequencing of inter-company LNP operational process flows is essential for seamless service to the customer.

- The new Local Service Provider should initiate the coordination of the LNP request from customer contact through service activation.

- Close review of the signaling arrangements between LSPs is necessary for the successful routing required for database services (Custom Local Area Signaling Services (CLASS) and Line Information Database (LIDB)).

- It is extremely important that the associations between each Local Service Management System (SMS) and Number Portability Administration Center (NPAC) have a high degree of availability.

- The entire trunking, Signaling System 7 (SS7) arrangements and signaling paths for all services (ISDN User Part (ISUP), LIDB/ABS, Calling Name (CNAM), and CLASS) need to be mutually agreed upon by LSPs and accurately documented by both interconnecting companies prior to testing and/or service introduction.

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INTRODUCTION

Purpose of Document

The purpose of this document is to report the test results of the Illinois FCC LNP Field Test (here after referred to as "Field Test"]. This report will not be updated.

Illinois FCC LNP Field Test Description

This section provides an overview of the Field Test and information on pre-field test logistics.

Overview of the Field Test

The Field Test took place in the Chicago Metropolitan Statistical Area (MSA) and included working NXXs that were currently supported by participating companies' switching systems. These switching systems included DMS®, EWSD, 4ESS®, 1AESS® and 5ESS®.[1] The Field Test exercised the LRN technology and operational processes which enable customers to be moved between LSP switches while keeping the same phone number. During the Field Test, Inter-exchange Carriers (IXCs) systems tested ported call routing to ensure delivery of ported numbers to the correct local service provider switch.

The Field Test allowed for platform testing with live traffic. This experience enabled participants to identify any database or other network modifications that might be necessary for large scale deployment of LRN. The Field Test provided insights into areas for future systems enhancements.

The Field Test commenced on August 11, 1997 and successfully concluded on September 26, 1997.

OBJECTIVE OF THE FIELD TEST

The objective of the Field Test was to demonstrate the feasibility of LRN as a long term database LNP solution in a functional network situation using participant equipment and personnel and to determine network and operational impacts. Areas impacted by LNP included back-office systems, operations, networks and billing. Test calls were not to be billed between participants during the Field Test, however the ability to produce a bill was tested.

Specifically, the Field Test was tasked to include the following:

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[1] DMS 100, 200, 250 are registered trademarks of Northern Telecom, Inc., (Nortel). 1AESS, 4ESS and 5ESS are registered trademarks of Lucent Technologies.

- Evaluate accurately the ability of various service providers to implement LRN or another technically feasible long term number portability method for providing LNP.
- Encompass issues relating to both network capability and billing and ordering systems, as well as maintenance arrangements.
- Test each providers public switched networks' capability of providing number portability.
- Test billing and determine impacts to the current billing and ordering systems, maintenance arrangements and operational processes.
- Identify technical problems in advance of widespread deployment of LRN or another technically feasible long term number portability method, thereby ensuring the integrity of the public switched network as a long term number portability solution is deployed nationwide.
- Design sufficient test scenarios to simulate the simultaneous failure of all (NPAC) databases in a region and the resulting impact on the local switches if any, should be characterized.
- Design test scenarios to predict the effect of switch based software fault factors on other network components.
- Design test conditions to ensure that adequate time has been allocated for the installation, testing and "soaking" of the software necessary for the implementation of long term number portability.
- Complete intra-company network testing prior to initiating inter-company network testing. The internal testing should be sufficient to ensure that the various elements are functioning properly before testing begins between service providers.

PARTICIPANTS

The following companies participated in the Field Test:

Ameritech
AT&T
Lockheed Martin
MCI
Sprint
TCG

The following table represents the primary technical contacts during the Field Test.

COMPANY	NAME	E-MAIL	TELEPHONE NUMBER
Ameritech	Bob Bartenstein	robert.bartenstein@ameritech.com	216-822-3912
AT&T	Debbie Cathey Eileen O'Shea	dcathey@att.com eoshea@att.com	732-870-7875 312-230-6322
Lockheed Martin	Steve Markowski	smarkowski@internetmci.com	312-382-8011
MCI	Hamp Oberle Anne Driscoll	5548404@mcimail.com 2185969@mcimail.com	703-918-0445 703-918-6831
Sprint	Larry Lovett Ron Whitson	Larry.Lovett.Ino@igate.sprint.com Ron.Whitson.ino@igate.sprint.com	423-854-8006 423-854-8040
TCG	Arthur Brett Rajeev Trika	bretta@tcg.com trika@tcg.com	718-355-5720 312-705-9940
LLC	Dick Dowd	2584443@mci.com	972-498-5069

| Test Plan | Bill Belshaw | bill.belshaw@mci.com | 972-498-5177 |
| 911 (Ameritech) | Nancy DeRoo | nancy.deroo@ameritech.com | 708-229-0461 |

REQUIREMENTS FOR PARTICIPATION

In order to establish the processes and identify impacts to network equipment, all participants needed to be familiar with:

- The LRN method of providing number portability
- All Field Test documentation
- The Mid-West NPAC's functions, Methods and Procedures
- Their own LSMSs/Service Order Administration (SOA) operations and Methods and Procedures
- The approved Operational Process Flows

In order to participate in the Field Test, each participant was required to:

- Modify switching and signaling equipment to accommodate the LRN solution.
- Work together in a spirit of cooperation and proactive communication.
- Develop their interface to the NPAC developed by ESI and administered by Lockheed Martin.
- Satisfactorily complete Inter-Operability testing with DSET corporation.
- Satisfactorily complete turn up testing with the Mid-West NPAC.
- Satisfactorily complete end-to-end baseline functionality testing within their own networks.
- Submit a written statement indicating that they consider their network to be ready to provide LRN/LNP service in the Chicago area.
- Provide an LSMS that conformed to the Functional Requirements Specification (FRS) and the Interoperability Interface Specifications (IIS) for Illinois as well as a Service Order Administration system (SOA).
- Each Field Test participant was responsible for documenting the results from their test scripts on a daily basis and submitting them to the Test Coordination Manager (Dick Dowd) on a weekly basis.
- Each participant was also required to provide input to the Final Report.

Additionally, the Mid-West Region Testing Committee asked participants to:

- Prepare their networks as needed to support the Field Test.
- Jointly develop the Field Test Plan, test scenarios, and test scripts through their participant representatives on the Illinois Testing Committee.
- Provide a Single Point of Contact (SPOC) for the duration of the Field Test.
- Provide a task force of support personnel, coordinated by the SPOC during test execution.
- Contribute to documenting the results of their portion of the Field Test.

PRE-TEST ACTIVITIES

SCHEDULE OF PRE-FIELD TEST ACTIVITIES

- Single Point of Contact named by April, 1997.

- NPA/NXXs to be opened for porting submitted to the Local Exchange Routing Guide (LERG) prior to June 9, 1997
- Satisfactorily complete Interoperability and turn up testing by July 16, 1997 (participants A - D, participant E completed this August 21, 1997)
- Service Provider (SP) to SP testing complete by August 8, 1997. (participants A - D, participant E completed this August 28, 1997)

PRE-TEST ACTIVITIES

- Determine Field Test Topography.
- Order all circuits to connect with NPAC.
- Install and test all interconnection circuits.
- Determine the SP to 911 Network and database connectivity.
- Determine NPA/NXXs to be opened.
- Determine Sub System Numbers, Point Codes, Translation Types, phone numbers, addresses, and LRNs.
- Select test cases to be performed.
- Prepare overall test matrix.
- Submit company registration to NPAC.
- Submit extracts to 911 databases.
- Establish SS7 interconnection requirements.
- Provision test phone numbers.
- Apply for a company ID through the National Emergency Number Association (NENA).

READINESS TO TEST STATEMENTS

"On 8/12/97 Ameritech has loaded all of it's service provider information into the NPAC and that we are ready to begin the FCC Field Test. Ameritech has received the LSRs from the other service providers and have begun processing the service orders. Confirmations were sent to the other service providers before 10:00 a.m. today."

"AT&T is production ready for the FCC LRN Field Test and began the LSR and FOC porting process on Monday (8/11/97)"

"MCI is prepared to participate in the FCC Test. Systems and personnel are ready to support the defined test cases and processes."

"Sprint has performed all internal testing of its Number Portability administrative system and network elements to ensure compliance with ICC LNP requirements. Sprint is ready to participate in the FCC LNP field Test which begins on 8/11/97."

"As of 8/29/97 Teleport Communications Group (TCG) has completed required SMS tests with the mid-western NPAC and is ready for entrance into the FCC LNP field Test that is currently in progress in MSA1 (Chicago). TCG's networks, systems and processes are up to date to handle the test scenarios that will be executed."

NPAC CERTIFICATION

INTEROPERABILITY VERIFICATION AND TURN-UP TESTING

To prepare for the Field Test, service provider connectivity and software required testing to verify interoperability and to verify functionality up to the application level. The NPAC SMS Interoperability Test Plan and the Turn Up Test Plan were executed in

accordance with the NPAC SMS Functional Requirements Specification (FRS) and the Interoperable Interface Specification (IIS) documents. The scope of the test plans were as follows:

- Provided service support documents that identified specific interoperability and turn up testing responsibilities to participating service providers and their respective SOA and LSMS vendor(s).

- Identified the minimum test set required to verify interoperability and application functionality.

- Interpreted the results of the tests.

SOA/LSMS Preparation for Interoperability Testing and Certification

Participating service providers were required to internally test their LSMS/SOA systems prior to initiating testing with the NPAC SMS. It was also required that the service provider OSI/RFC1006 compliant stack be CTS-3 certified. After internal testing was completed interoperability testing was initiated with the NPAC SMS. Scripted LSMS/SOA initiated test cases and drivers (defined in the Interoperability Test Plan), were created to be executed by the service providers for interoperability testing. Once interoperability testing was complete as described below actual testing with the NPAC SMS could begin.

SOA/LSMS Interoperability Testing and System Validation with the Test Lab

Interoperability testing between the service provider LSMS/SOAs and the NPAC/SMS test lab ensured that each service provider could meet the technical and operational processing requirements for the transactional exchange of ported service provider information. Test phases included: Connectivity, Managed Objects, Security and Recovery, and Application to Application.

Interoperability test scenarios addressed general areas of LSMS/SOA conformance to the ISO/ITU standards for OSI Conformance Testing Methodology and Framework. LSMS/SOA conformance was validated through:

- Basic Interconnection Tests (S2S and limited Security tests)
- Capability Tests (MOC)
- Behavior Tests (Security, MOC, and Recovery)

The four mandatory test sets for interoperability are described below:

1. Stack-to-stack (S2S) test cases applied to the SOA and/or LSMS to NPAC SMS interfaces were identical. The S2S test cases in this plan tested the ACSE connectivity between the SOA/LSMS and the NPAC SMS.

2. The Security test cases verified the functionality of each item in the lnpAccessControl field. For example, these test cases addressed the systemId, cmipDepartureTime, sequenceNumber, listId, keyId, and signature sub-fields.

3. Managed Object Conformance (MOC) test cases addressed the basic operations of each Managed Object (MO) in the system. They tested everything described in the MOCS and the GDMO file except for the application-to-application level of behavior of the MOs.

4. The Application to Application (A2A) test cases verified the behavior of the application on the SOA and the LSMS. They focused on the transactions allowed by the two interfaces including multiple MO classes and CMIP requests/responses.

The following vendor SOAs and LSMSs passed interoperability testing by meeting exit criteria.

ATT LSMS	Passed
ATT SOA	Passed
Bellcore SOA	Passed
Bellcore LSMS	Passed
Evolving Systems LSMS	Passed
Evolving Systems SOA	Passed
Lucent Technologies LSMS	Passed
SHL Systemhouse LSMS	Passed
SHL Systemhouse SOA	Passed

Interoperability Test Reports

After completion of NPAC/SMS interoperability testing, a test report was created by the Test Center. The test results included a matrix describing the test cases successfully completed by each participating vendor. This matrix, is available at **Error! Bookmark not defined.** and is titled the Interoperability Test Resuts Matrix. Additional information following the Test Results Matrix, is a second matrix listing the test cases required to fulfill exit criteria for interoperability testing. It is also available at **Error! Bookmark not defined.**.

NPAC SMS Turn-up Testing

When service providers obtained LSMS and/or SOA interoperability verification, connection to the production NPAC/SMS was made to conduct Turn-up Testing. The Turn-up Test Plan addressed issues specific to interaction of the NPAC SMS and service provider systems within the production environment. The Turn Up Test Plan validated that the SOA and LSMS systems and the NPAC provided the elements necessary for local number portability. It also verified the functionality of the CMIP interfaces, ensuring interactivity with the NPAC SMS, the LSMS, and other service provider SOAs. The scope of this testing allowed service providers to test and repair problems with LSMS or SOA functionality.

Turn up Testing verified the following functionality:

- Network Data - Create, modify, delete and query
- Subscription Data - Create, modify, delete, activate, cancel, conflict resolution, and query
- Audit Subscription Data
- Recovery
- Performance
- Service Provider to Service Provider Integrated Testing
- NPA Splits

Turn Up Testing Report

A summary that names and briefly describes the minimum required Turn Up Test Cases is available on **Error! Bookmark not defined.**. It is a matrix titled _NPAC SMS Exit Criteria_. a second matrix titled _NPAC SMS Turn Up Test Results_, which describes the results of each test case for each service provider participating in the FCC Field Test, is also available at www.npac.com.

FCC FIELD TEST EXECUTION

PORTING PROCESS

The participants utilized the inter-service provider LNP operations flows approved by North American Numbering Council (NANC) to guide the SPs through the service order processing. Each SP generated service orders. After service orders were written, the appropriate Local Service Requests (LSR) were generated. The corresponding SP responded with the Firm Order Confirmations (FOC). The ability to interact with each other via the NPAC was validated.

The following processes were confirmed:
- Code opening
- Basic porting
- Conflict resolution
- Cancel pending port
- Disconnect

Technical issues encountered:

NONE

Procedural issues encountered:

- All NPA/NXXs were not properly entered into some networks, causing calls to be misrouted. (Recommendation - Ensure all personnel follow the code opening process.)
- LSRs were not always accurate or complete resulting in some ports being put into unnecessary conflicts. (Recommendation – Ensure all personnel follow the LSR process and completely fill out the LSR.)

BASIC MESSAGE INTERACTION

Prior to porting, participants A - D validated that calls could be completed to each of the other service providers. This tested the ability to make calls between non-ported numbers.

Throughout the Test, all participants successfully completed call through testing in the categories listed in the test matrix (attachment III).

Technical issues encountered:

NONE

Procedural issues encountered:

- The direct trunk groups were not configured the same at both ends, resulting in some calls not completing.
- Default routing (Where the terminating LSP receives traffic from another provider where a query was not made) was not properly set in some switches. This caused mis-routed calls.

- One end office did not have LRN set to yes. This caused calls to terminate to the LRN, and not the dialed digits.
- One tandem did not have the SS7 interface set up correctly. (Common Network Interface (CNI) ring was not set up with a translations type of 11.) This caused the tandem switch to not send the LNP queries, which would not cause the call to fail if default routing was set correctly. Since default routing was not set up, the call did fail.
- At several end office switches the local digit interpreter table Local Digit Interpreter Table (LDIT) was not set correctly. This caused calls to terminate to the LRN, not the dialed digits.
- Direct trunk groups were not set up to accept 10 digits in the Generic Address Parameter (GAP) parameter. This caused calls to a ported number to fail.
- Default 10 digit Global Title Translation tables were missing for some NPA/NXXs. This caused calls to fail.
- 6 digit default route table was missing in number portability Service Control Point (SCP). This caused calls to fail.
- SS7 topologies arrangements were not accurately depicted thus causing SS7 signaling not to function properly (signaling failures).

CLASS

Once the networks were properly set up, CLASS was successfully tested. However, setting up the network for providing CLASS services on ported numbers between networks proved to be a complex and challenging initiative. The flexibility of SS7 routing allows for various CLASS global title translations deployment (e.g., the global title translations could be done in SCPs, Signaling Transfer Points (STP), or end office switches). To aid in the trouble shooting process, it is important to understand the interconnecting service provider's GTT deployment.

Technical issues encountered:

- A switching module was found to be defective causing intermittent CLASS feature failures.
- An invalid bit parameter in the SS7 message from a number portability SCP caused CLASS calls to fail. Once the vendor corrected the problem, CLASS calls successfully completed.

Procedural issues encountered:

- While negotiations to allow for the passing of CLASS messages between service providers was complete, Gateway screening was inadvertently left on (not open). This resulted in CLASS features failing.
- Network/cluster IDs were not loaded in some end offices to allow for the acceptance of CLASS messages.
- Destination Point Codes (DPC) were not completely loaded in all networks.
- One pair of mated STPs was not defined which resulted in inadvertent CLASS failures.
- A secure feature in a switch allowing for caller ID was not turned on.

911

Each participant successfully completed calls from numbers that were ported into them to 911. Service Providers also issued migrate and unlock records for porting of numbers. These records included the company's 3 - 5 digit company ID (as required

and defined by National Emergency Number Association (N.E.N.A.)). The 911 tests that were performed by all service providers during the FCC field test passed successfully. All participants utilized the new function codes of "U & M", instead of disconnects and installs, thereby alleviating the record removal from the 911 database. This adheres to the new N.E.N.A recommended standards. All of the service providers have received a 3-5digit code, as a Company Id, from N.E.N.A. and that identifier was put on the individual record in the 911 database.

All service providers experienced a little difficulty with the function codes and getting orders completed, the same time as the porting process took place. This is probably the area that most companies will experience their difficulty. It is believed that this difficulty was due to the processes being new to the user rather than problems with the processes.

911 calls were made, transferred, and called back to, by the PSAPs. Verification of the ALI screen data, customer name, address and Company Id was made during the calls. The calls were made from different rate centers, affecting different PSAPs.

Technical issues encountered:

- A Public Safety Answering Point (PSAP) transfer problem with one vendor's switch was identified and resolved during pre-field testing. (911 feature package did not allow accessing any type of trigger.)

Procedural issues encountered:

- All service providers experienced minor difficulties initiating the new U & M process. It is believed that as the service providers gain experience with the new process that this will go much more smoothly. There does not appear to be any problem with the actual process.

OPERATOR HANDLED CALLS

Operator services platforms were successfully tested. Tests included: calling card, collect, bill to third, sent paid; dialed 0-, 0+ operator assisted, 0+ automated. All calls completed successfully once the problems described in the basic message interaction section were resolved. LNP queries were launched from the Operator Service System (OSS) for called, billing, and calling numbers where appropriate. AMA records were generated containing the proper LRN/LNP billing data.

LIDB validation queries were launched by the OSSs. The queries successfully accessed the LNP database for LIDB routing information and then routed the query to the appropriate LIDB. Generally, validation response time ranged from 600 to 1300 milliseconds, which is well below the current 2 second time out criteria.

Technical issues encountered:

- Service providers utilizing DMS/TOPS switches were unable to perform the busy line verification test case due to a software deficiency. A software patch from the vendor is currently in beta testing.

Procedural issues encountered:

- An issue was encountered when originating LIDB queries outside the Test area attempting to validate a billing number that was ported and moved to another LIDB.

The issue is due to the Gateway Screening that is performed at the various hub vendor locations. It is imperative that the ported to LIDB owner is prepared to accept queries over all link sets based on billing arrangements. In addition, all hub vendors should open their gateway screening to accept queries from any query originator. (Additional details can be found in attachment I.)

WIRELESS

Calls were successfully completed between ported numbers and cellular numbers.

Technical issues encountered:

NONE

Procedural issues encountered:

NONE

ISDN (Integrated Services Digital Network)

Speech calls were successfully validated when ISDN lines were ported.

Technical issues encountered:

NONE

Procedural issues encountered:

NONE

CUSTOM CALLING

Custom Calling Features (call waiting/cancel call waiting, three way calling, call forwarding, caller id) were successfully tested on ported and non ported numbers without loss of functionality.

Technical issues encountered:

NONE

Procedural issues encountered:

NONE

BILLING

In order to properly rate and guide messages when ported numbers are involved, new modules to support Automatic Message Accounting (AMA) records were introduced.

All Service Providers captured AMA records for validation purposes. These records were analyzed by each Service Provider. No new billing issues were identified by the Field Test.

Technical issues encountered:

- The field test did not identify any new billing issues. However, various billing issues may have been identified outside the field test which the National Billing and Rating forum is looking into.

    NONE

Procedural issues encountered:

- In one of the switches, the LRN feature bit had not been turned on. This resulted in the LRN module not being appended on the AMA records.

MAINTENANCE ARRANGEMENTS

There is nothing to report regarding maintenance for the Field Test.

OTHER TECHNICAL PROBLEMS

A problem was identified with the EWSD switch. The LNP query response returns to the same point in the switch for both voice and data. Since there is only one route out (the voice route) of the switch the data call fails. A translation fix was developed, tested and installed.

The following was received by Ameritech in response to their CSR from Siemens Stromberg Carlson:

In the EWSD, ISDN lines are assigned a line class code for voice and a separate line class code for circuit switch data (CSD). The line class codes (LCC) are assigned to Originating Marks (ORIG1) for screening and routing. The voice LCC is assigned to an ORIG1 that routes voice calls on our regular network. The LCC for CSD routes the call to our overlay network which is designed to carry 64kb traffic. When an ISDN customer originates a CSD call, the switch uses the CSD LCC and routes via the overlay network.

The CSD LTNP problem that surfaced during the trial was that once a query is launched, the response (routing) information from the SCP returns to a LTNP ORIG1 that is used for routing LTNP calls. Whether the call was a voice or data call, they both use the same LTNP ORIG1 assignment. The LTNP ORIG1 routing was assigned to the regular voice route. This caused the CSD call to fail.

The fix is to add bearer capability routing to the LTNP ORIG1. This requires adding each bearer capability and assigning it to the proper route (e.g. voice routes to the regular network, CSD routes to the 64kb overlay network).

SWITCH BASED FAULT FAILURES

The Test Committee determined that we should not introduce faults into the Public Switched Network during the Field Test.

DATABASE FAILURES

No database failures were noted during test execution. The SPOC Team determined that we would not introduce failures into the live public switched network. These types of failure testing should be performed in a controlled environment.

SUMMATION

In summary, the Single Point of Contact Team concludes that the Field Test adequately tested the long term database LNP, (LRN) solution. Though several procedural issues were encountered, the SPOC team feels that these will be corrected with experience. No technical issues were identified by the team that would prevent the deployment of LRN. Though a vendor fix has not been received for a technical issue identified above, this problem can be corrected through switch translations.

ATTACHMENTS

I. LIDB description

LNP LIDB Validation Issue

The following describes a scenario for Local Number Portability involving LIDB validation queries.

The scenario involves a number that has ported to one service provider and the LIDB validation location has moved to another LIDB provider (other than the incumbent). When the validation query originates from a company/network that is not directly involved in the LNP service in the specific MSA, the query may fail when trying to validate at the new LIDB location. The reason for the failure is due to the Gateway Screening that is performed at the various hub vendor locations.

. The following is an example of the validation query failure scenario:

A customer who has 630-435-0195 has ported from Ameritech to MCI. MCI stores their ported customers in Illuminet's LIDB. The customer is now in New York City making an intraLATA call and billing it to 630-435-0195 (bill to third)

- A query is launched from the Operator Services switch (calling party address) in New York.

- The query is sent over the SS7 network to Ameritech where a GTT (Global Tittle Translation) is done at the Ameritech STP.

- The NPA-NXX is portable so a query is sent to Ameritech's LNP/SCP to determine if the number is ported and if the LIDB validation location has changed.

. - In this case the new LIDB location is Illuminet and the Destination Point Code (DPC) of Illuminet's LIDB is used to re-launch the query.

- Ameritech sends the query to their hub vendor GTEINS. Ameritech contracts with GTEINS to send queries to other LIDBs.

- GTEINS receives the query over SS7 links from Ameritech.

- Using STP gateway screening type features they check to determine if the calling party address (New York OS switch) in the query is allowed on the links.

- Because GTEINS is not expecting queries from NYNEX on these links and also that GTEINS has no billing relationship with NYNEX the query fails and times-out.

- The customer in NYNEX is most likely prompted for another billing method.

After contacting GTEINS, they agreed, for the trial, to allow all queries to flow through their network, from Ameritech, regardless of the calling party address. Once this was done the query from NYNEX apparently made it through GTEINS but was blocked at the Illuminet STP. It was blocked there because Illuminet is not expecting to receive queries from NYNEX over the links from GTEINS because NYNEX currently use SNET to send queries to Illuminet's LIDB. This was confirmed in a conversation with Illuminet.

From my understanding of the current screening in the SS7 network, calling party addresses are screened and only accepted on specific links. This is to protect the security of the network.

A related issue to the above involves how hub vendors count queries for billing purpose. My understanding is that they count queries based on calling party address and then render a bill to that company. Obviously, queries hitting hub vendors from companies with which they have no billing arrangement will cause a problem.

The above issue is not unique to the Illinois trial. This is a nationwide LNP issue and must be addressed with companies directly involved with LNP including LIDB owners and SS7 hub vendors.

Carmen Colella
Ameritech
847-248-5345

II. White Papers

Ameritech

SUMMARY OF FINDINGS FOR LNP/LRN ILLINOIS FCC FIELD TRIAL

INTRODUCTION

On September 26, 1997 Ameritech concluded its participation in the FCC Field trial for LNP/LRN. Based on the results of the testing during the trial, Ameritech is prepared to offer local number portability (LNP) concurrent with the general availability of the Number Portability Administration Center (NPAC).

` The purpose of this white paper is to provide an overview of the steps taken by Ameritech to enable the implementation of LNP using local routing number (LRN) technology.

SIL TESTING

One of the first steps taken by Ameritech to prepare for the implementation of LNP is to test the technology in its Services Integration Laboratory (SIL). A test plan was developed documenting a series of test cases that exercised the Service Switching Point (SSP) and Service Control Point (SCP) switching and signaling requirements as they applied to LNP.

SIL testing consisted of three phases; Network Element (NE) stand-alone testing, NE to NE testing as well as all elements together, and service verification testing.

The individual component testing verified the protocol and the local Operations Administration and Maintenance (OA&M) procedures (e.g. SSP trigger and data administration). This phase of testing verified simple sequences of messages using simulators for the other NEs. This testing also included NE load testing.

Integration testing consisted of testing the interfaces between the NEs using protocol monitors and call scenarios. These scenarios checked the basic LNP LRN and Global Title Translation (GTT) call processing capabilities as well as ensured SCP-SSP and SSP-SSP communications. Integration testing also tested interactions between switch based features and LNP capabilities, both pre and post query.

Service verification testing employed the LNP feature set, in service scenarios, to verify network call processing services, network OA&M functionality, and network recovery from error.

The SIL testing also included testing of the NPAC interfaces to the Service Management System (SMS) and from the SMS to the SCP including load testing.

The SIL testing took place from 10/1/96 to 6/1/97 and was performed in a multi-vendor environment. The satisfactory completion of SIL testing validated for Ameritech that the LNP/LRN hardware and software functioned properly and would not

induce any problems into the Public Switched Network (PSN). The successful completion of SIL testing allowed Ameritech to move forward to the next stage of testing.

TEST TOWN TESTING

The second step in testing LNP LRN was to test the technology in a live network. Ameritech calls this "Test Town" testing. To ensure the customers' ability to use features, all known features with possible interactions/inter-working with LNP needed to be tested. Therefore, the focus of the test plan was on features and services that have potential network interoperability impacts.

The LNP LRN software and hardware were deployed in a few selected offices in the Stewart and Joliet Rate districts. Tests were performed by simulating calls involving LNP and having interactions with other features and services at the point of originating and or terminating access.

The "Test Town" testing started on 5/27/97 and satisfactorily completed on 7/25/97. The satisfactory completion of Test Town testing validated for Ameritech that LNP/LRN worked with existing features and services and had no interoperability impacts on the PSN. The successful SIL and Test Town testing paved the way for Ameritech's participation in the FCC field trial.

OPERATIONS SUPPORT SYSTEMS DEVELOPMENT & TESTING

The implementation of LNP required modifications to Ameritech's Operational Support Systems (OSS). The OSSs fall into three categories:

* Ordering and Billing

* Provisioning

* Maintenance

Detailed requirements were developed to enable flow through processing of LNP. The appropriate vendors were contacted for this process and development and delivery of the required changes were negotiated. Each of the affected OSSs were tested individually and through an end-to-end integrated testing process.

The integrated process validated system enhancements for: order issuance; service provisioning; accurate recording in the maintenance systems; and customer bill issuance. In addition two new OSS products were introduced to support NPAC interfaces - SOA and LSMS.

Additionally, all work process flows were reassessed and appropriate Methods and Procedures (M&P) were developed. All affected Work Center personnel participated in related training. These new processes were validated in conjunction with integrated OSS testing.

Ameritech also participated in external industry testing of the NPAC. Two test phases were completed in support of the FCC Field Trial. Those were: Turn Up Testing

and Service Provider to Service Provider (SP2SP) Testing. Ameritech successfully completed these test phases.

ILLINOIS FCC FIELD TRIAL

Ameritech's participation in the field trial validated that numbers could be ported between service providers and that calls could be routed properly while maintaining all features and functionality offered by Ameritech. In addition to validating service order provisioning and call routing, Ameritech is in the process of reviewing the AMA for the test lines that were used for the FCC field trial. No new AMA recording issues have been identified yet for the test lines. During the SIL and Test Town testing extensive review of AMA was performed. Numerous LNP AMA issues were identified and referred to the switch vendors. Most have already been corrected. The remaining issues are being worked by the vendors, and are not expected to have a significant impact on usage billing before they are fixed. Since generating a bill follows provisioning/usage testing generally by one month, Ameritech is still in the process of verifying the FCC field trial results. However, Ameritech did produce final bills for the exported accounts with associated usage for the FCC field trial. Ameritech also produced bills for the imported accounts with associated usage during the trial.

SUMMARY

Ameritech has worked closely with our switch, SCP and STP suppliers for the past two years to test their products for compliance with the LNP LRN specifications. At times, weekly calls with our major suppliers were conducted to ensure that problems were fixed. This cooperation along with Ameritech's internal test processes have enabled us to work through and solve a myriad of issues.

The FCC field trial has validated for Ameritech that LNP LRN works and that the changes we have implemented in our network and OSSs also support LNP.

As stated above Ameritech is prepared to offer local number portability.

AT&T

AT&T
SUMMARY OF FINDINGS FOR LNP/LRN ILLINOIS FIELD TRIAL

AT&T participated in the Illinois Field Trial as a Local Service Provider using two end office switches. AT&T participated as both a local service provider and as an Inter exchange Carrier. Location Routing Number (LRN) technology was tested by AT&T both in our internal network as well as in partnership with the other participating carriers. It is AT&T's conclusion after completing all the test cases successfully that both the architecture and performance of LRN was proven to be sound and can be implemented in the MSAs per FCC order.

AT&T completed all planned test cases successfully. These test cases fall into the following categories:

*   Porting Process
*   CLASS
*   911 and E911
*   Default Routing
*   Basic Calls
*   OSPS
*   Wireless
*   Cause Code 26 (a planned error condition)

These test cases were run multiple times with no negative end results. AT&T believes that the multiple iterations of the test cases provided educational awareness, network element testing and provisioning under rigorous conditions, and interaction with other service providers sufficient to prepare our network for national deployment of local number portability AT&T incorporated and tested with the other trial participants the improvements in provisioning and operations identified as lessons learned. AT&T fully supports and agrees with this section of the report

The cooperation between all of the trial participants was exemplary and was key to the success of the trial. All participants demonstrated flexibility, coordination and a willingness to learn together. The inter company processes established for the trial will roll over into production and implementation of local number portability. The business processes developed and adopted by NANC were implemented and sustained in the trial environment, requiring no mid-trial corrections or changes.

Even though AT&T used test numbers, not revenue producing customers, for the trial, we did exercise our internal systems to produce bills for the numbers that were ported to us. These bills included calls to and from ported numbers demonstrating that customers were able to originate and receive calls through routing to the LRN and that no impact to switch recording occurred. AMA records were captured with the LRN modules appended and forward to AT&T's downstream processes. LRN implementation had no negative affect on rating, guiding, or billing.

While no new access charges are introduced with the implementation of LRN, we did verify that the correct access data is recorded in terminating access records to identify originating carrier for a ported number, even though no actual carrier bills were issued.

The LRN software was first tested in a lab environment as is all new software installed in AT&T's network. Depending on the complexity of the software, this soak session may be from several days to several weeks. LRN was soaked in our lab for approximately five months. The performance of AT&T's public switched network was not impacted by the introduction of LRN into our network. The network reliability metrics AT&T uses to measure network performance continue to monitor the network

health, including now the addition of LRN switch software and LRN NCPs and LSMS elements.

To address the Gateway Screening issue related to Operator Handled Calls, AT&T recommends that all LSPs ensure that the appropriate network topology, billing and network provisioning business arrangements be in place between all interconnected networks, including hub providers. These business arrangements will ensure that Gateway Screening and per translation billing for SS7 queries are handled correctly in an LNP environment.